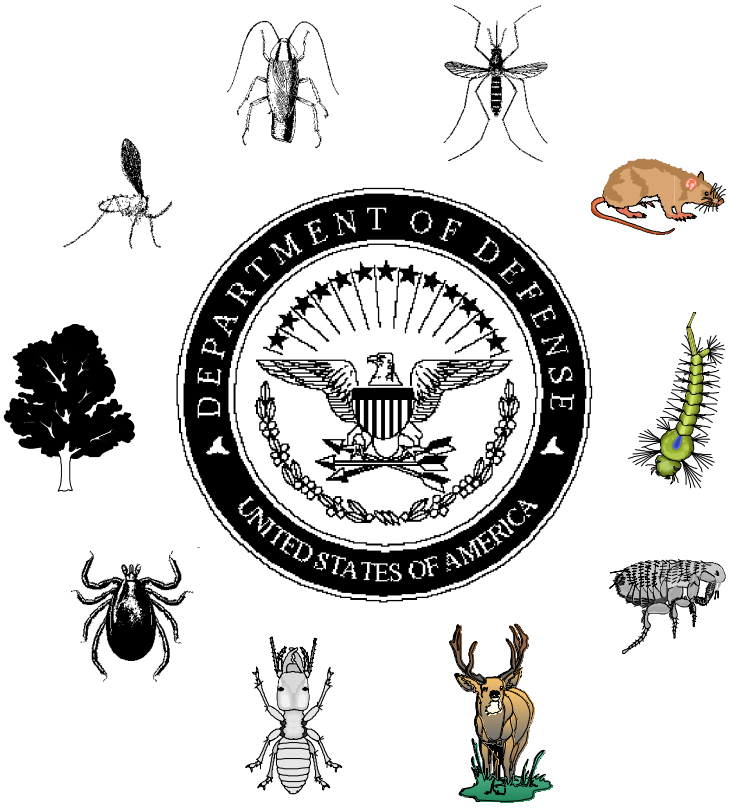
ARMED FORCES PEST MANAGEMENT BOARD

TECHNICAL INFORMATION BULLETIN

DEFENSE PEST MANAGEMENT INFORMATION ANALYSIS CENTER



MAY-JUN 1995

DEFENSE PEST MANAGEMENT INFORMATION ANALYSIS CENTER

ARMED FORCES PEST MANAGEMENT BOARD

FOREST GLEN SECTION, WALTER REED ARMY MEDICAL CENTER

WASHINGTON, DC 20307-5001

TABLE OF CONTENTS

Managing Editor/Writer . . . . . 1Lt Craig Forcum
Co-Editor/Writer . . . . . Dr. Rich Robbins
Medical Entomology Writer . . . . . LCDR Jeff Corneil
Medical Entomology Writer . . . . Maj Terry Carpenter
Editor/Typist . . . . . Ola Tilghman

TECHNICAL INFORMATION BULLETIN (TIB)

RECIPIENTS: The TIB is published by the Defense Pest Management Information Analysis Center to provide current information that may be of interest to the DoD pest management community. Comments, questions, and contributions are welcomed. Please send them to: Chief, DPMIAC/AFPMB, Forest Glen Section, WRAMC, Washington, DC 20307-5001, or call DSN 291-5365, (301) 427-5365; FAX (301) 427-5466. Reference to a commercial product or source in the Bulletin does not constitute DoD or AFPMB endorsement, unless specifically stated as a recommendation for DoD personnel. The Secretary of Defense has determined that publication of this periodical is necessary in the transaction of the public business, as required by law of the Department of Defense.

ANNOUNCEMENTS

AFPMB/DPMIAC Activities

- **Measures of Merit** - The Components have provided data for one measure of merit (pounds of pesticides used) in the base year FY 93. Data for all three pest management Measures of Merit for FY1994 were due by the end of March. - CAPT Bolton, AFPMB, POC.

- **Briefings on Toxicological Studies on the Interaction of DEET, Permethrin, and Pyridostigmine** - COL Perkins attended the interagency Persian Gulf Research Working Group meeting held at the Armed Forces Institute of Pathology on June 14-15. He was asked by the Chairman of the VA's Persian Gulf Expert Scientific Committee to speak at the Committee's June 26 meeting. CAPT Bolton is to speak at the VA's Continuing Medical Education Conference, "Update on Health Consequences of Persian Gulf Service." - COL Perkins, AFPMB, POC.

- **Pesticide Use/Risk Reduction Partnership with EPA** - The EPA wants to include the DoD pesticide use reduction initiative in their new "Pesticide Environmental Stewardship Program." We prepared a draft interagency agreement on cooperation between the DoD and EPA "with respect to integrated pest management (IPM)." Officials at EPA have informally reviewed and commented on our draft. We incorporated their comments, including their concerns about DoD-controlled golf courses and the possibility of procuring IPM-produced commodities, and will begin the formal review process within DoD. - LtCol McKenna, AFPMB, POC.

- **Pest Management Research Requirements** - On May 26, revised pest management research requirements were forwarded to the U.S. Department of Agriculture through DUSD(ES) and DDR&E. These requirements are also being incorporated into the upcoming version of the Defense Environmental Technology Requirements Strategy (DETRS). - Maj Carpenter, AFPMB, POC.

- **Brown Tree Snake Control Plan** - The draft Plan is complete and was published in the Federal Register on May 4. After the opportunity for public comment (which ended on June 19), the Plan will be submitted to the Non-indigenous Aquatic Species Task Force and eventually to Congress. - Dr. Egan, AFPMB, POC.

- **Memorandum of Understanding (MOU) on Biological and Toxicological Testing of Pesticides between DoD and U.S. Department of Agriculture(USDA)** - This MOU, which coordinates efforts between DoD and USDA on insect repellent development, is at the U.S. Navy Bureau of Medicine and Surgery for coordination; coordination with DUSD(ES) and USDA still needed. - COL Perkins, AFPMB, POC.

- **Memorandum of Agreement (MOA) between the Armed Forces Medical Intelligence Center (AFMIC) and the Defense Pest Management Information Analysis Center (DPMIAC)** - As required by the terms of this agreement, AFMIC and DPMIAC are reviewing this MOA. Of particular concern is the request by the Joint Staff and the Unified Commands for "one stop shopping" on information concerning vector-borne diseases. - COL Driggers, AFPMB/DPMIAC, POC.

- **Defense Pest Management Information Analysis Center (DPMIAC) Publications** - A number of publications are under development; the draft Technical Information Manuals on the "Africanized Honey Bee" and on "Personal Protective Techniques Against Insects and Other Arthropods of Military Significance" are out for approval by the AFPMB Council. Five new Disease Vector Ecology Profiles are being written. - COL Driggers, AFPMB/DPMIAC, POC.

- **Requests for Defense Pest Management Information Analysis Center (DPMIAC) Services** - Since October 1994, DPMIAC has responded to 387 requests for pest management information. - COL Driggers, AFPMB/DPMIAC, POC.

DoD Memoranda of Agreement - The Department of Defense has developed good working relationships with many state pesticide regulatory offices. To further facilitate this communication, the DoD and many states have signed a Memorandum of Agreement (MOA). Each of the 38 state pesticide regulatory offices is contacted during the anniversary month of their MOA for coordination and information exchange. This month we will be reviewing

and updating our MOAs with the States of Indiana, Iowa and Ohio. The following table includes the states that DoD has an agreement with and the date it was signed. For further information, contact Linda Fink at the AFPMB Tel: 301-427-5191 DSN Prefix 291.

STATES	DATE AGREEMENT SIGNED
Alabama	JUL 1986
Alaska	OCT 1986
Arizona	NOV 1993
Arkansas	MAR 1986
Florida	APR 1987
Georgia	JUL 1980
Hawaii	AUG 1986
Indiana	JUN 1986
Iowa	JUN 1988
Kentucky	SEP 1986
Maryland	APR 1986
Michigan	MAY 1986
Minnesota	AUG 1986
Mississippi	OCT 1986
Missouri	OCT 1986
Montana	JUL 1987
Nevada	JAN 1987
New Jersey	JAN 1987
New Mexico	JUL 1987
North Carolina (2 MOAs)	AUG 1986 APR 1987
North Dakota	DEC 1986
Ohio	JUN 1988
Oklahoma	MAY 1986
Pennsylvania	MAY 1986
Rhode Island	NOV 1988
South Carolina	AUG 1986
South Dakota	OCT 1987
Tennessee	AUG 1986
Texas	MAY 1986
Utah	AUG 1986
Virginia	APR 1986
West Virginia	DEC 1986
Wyoming	NOV 1986

Key ARS Leader Retires - Dr. Mary E. Carter, Area Director of the USDA Agricultural Research Service (ARS) South Atlantic Area, retired from federal service on April 29, 1995. Dr. Carter began her career with ARS in 1971 when she was appointed Lab Chief of the Textile and Clothing Lab in Knoxville, TN. In 1992 she moved to Athens, Georgia to become Director of the South Atlantic Area.

Dr. Carter has been a strong supporter of DoD-USDA cooperation and has been a mainstay at the annual DoD-USDA Research Reviews. ---- E-mail messages dated 25 April 1995 from Dr. M. E. Carter, and 28 April 1995 from Dr. R. D. Plowman.

Retirement of Dr. Richard S. Patterson from the ARS - Dr. Richard S. Patterson retired from federal service on June 2, 1995. He has a long record of teamwork with the United States Department of Defense, starting with a 2-year tour of duty as an Army entomologist from 1955-1957, after completing his MS at the University of Massachusetts in 1955. He has been with the ARS in Florida, working with the former Insects Affecting Man and Animals Lab, now the Medical and Veterinary Entomology Research Lab.

Over the years, Dr. Patterson's innovative and progressive work on urban pests, recognized internationally as making valuable contributions to society, also benefitted the DoD, contributing to better disease vector control and a cleaner, safer environment. His Awards and Honors are numerous, and include two Outstanding Research Awards, a Distinguished Service Award for scientific achievement, and Outstanding Scientist in USDA-ARS. At his retirement ceremony he was presented the flag of the United States, flown over the Capitol in his honor in appreciation for his work on behalf of the US Armed Forces, with thanks for his selfless contributions to our nation's defense. ---- Maj Carpenter, AFPMB.

INTEGRATED PEST MANAGEMENT

Mechanical Control of White Grubs in Turfgrass Could Reduce Pesticide Use - Two scientists at the University of New Mexico have shown that the use of turfgrass aerators with appropriate hole patterns can reduce subterranean pest populations to manageable levels and should be considered for use in integrated pest management programs to reduce reliance on pesticide application.

Turfgrass is a complex biological system, and its maintenance relies on large amounts of water, fertilizer, pesticides, and labor. The cost of maintenance of the 8-10

million hectares of turfgrass in the United States totaled an estimated $15 billion in 1985. White grubs are an important pest in turfgrass across much of the United States, including lawns, airfields, and golf courses. Control of white grubs is based almost exclusively on the use of chemicals. Environmental, legal, economic, and other factors are making it increasingly difficult to use chemical insecticides for white grub control. Aeration of turfgrass is a procedure currently in use to facilitate the exchange of air and water within the root system; to reduce water, fertilizer, and pesticide runoff; to increase root depth and extension; and to stimulate shoot density and thatch decomposition. However, it had not been studied, to the scientists' knowledge, as a pest control alternative. They examined the possible role of aeration machines that, besides their usual function, appear to have the capacity to reduce subterranean pest populations such as white grubs.

Using the spatial distribution of white grubs in 100 observations to simulate the potential mortality caused by 221 different hole patterns of 18 commercial turfgrass aerator models, hole patterns arranged in a 2" x 2" distribution with tine diameters of 1" and 3/4" produced grub mortality of over 40%. The efficiency of the tested designs, as measured by the overall percentage of mortality under moderate and light grub infestation was significantly high. The results showed that the percentage area made by aerator holes is not directly proportional to mortality; the distribution of holes is as important as the area affected by them. Several of the tested models also had a turfsaver, a device that prevents the machine from lifting the grass while working, which is especially useful in avoiding injury to the grass in highly infested areas.

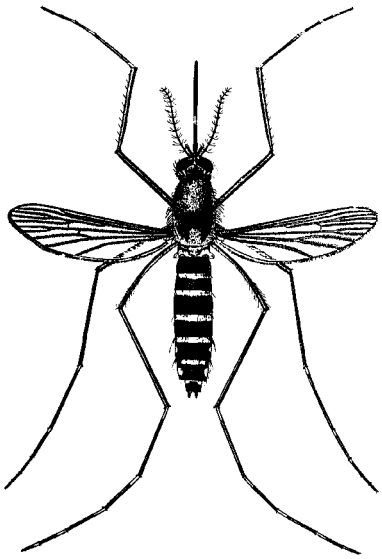
This study addressed the important role of mechanical control in turfgrass maintenance and its role in pest control. The use of an efficient hole pattern, as shown in three of the tested models is projected to reduce grub populations by up to 50% in areas where insect density reaches an average of 150 grubs per square meter, the action threshold suggested by previous research, and should have a place in an integrated pest management program where appropriate. ---- *Environ. Entomol.* 24(2): 243-245 (1995).

Decapitating Fly Is Possible Biological Control Agent for Imported Fire Ants - In a study of the growth and development of the parasitic phorid fly *Pseudacteon litoralis* Borgmeier in the fire ant, *Solenopsis invicta* Buren, it was found that the fly apparently lays one egg in or on the thorax of a major worker. When the egg hatches, the maggot migrates into the head of the ant and develops through its last two instars in approximately three weeks at 23 degrees C. Just before pupariation, it apparently secretes an enzyme that begins dissolving the cuticular membranes of the ant. The maggot then consumes the contents of the ant head, a process that usually results in decapitation of its living host. The maggot then pushes the mouth parts aside and pupariates within the empty head capsule, positioned so that the anterior three segments precisely fill the oral cavity. The pupal stage lasts approximately three weeks. This study demonstrated that the fly has promise for release as a natural biological control agent for imported fire ants, and could supplement chemical control methods and reduce the need for pesticide applications. ---- *Environ. Entomol.* 24(2): 475-479 (1995).

Good Mites Fight Bad Mites and Reduce Pesticide Use 75% - Two predatory mites are helping the US National Arboretum cut the use of chemical pesticide. The Agricultural Research Service operates a 444-acre arboretum in Washington, D.C. The good mites, *Phytoseiulus persimilis* and *Amblyseius californicus*, feed on two-spotted spider mites and other mites that damage bonsai, roses, and other plants. The beneficial mites play a big role in the arboretum's integrated pest management (IPM) program. Among the first of its kind for landscaping, the program has reduced pesticide use about 75 percent since 1992. ---- *Agricultural Research*, April 1995, p. 23.

PESTICIDES & EQUIPMENT

"Mosquito Plant" and Avon Skin-So-Soft[R] Credibility Check - Field tests in Michigan during May and June 1993 using humans as bait compared the efficacy of 95% DEET, Avon Skin-So-Soft[R], burning 26% pyrethrum coils, and the Citrosa plant (a.k.a. "Mosquito Plant"), *Pelargonium citrosum* as mosquito repellents. R. J. Cummings and G. B. Craig of Notre Dame University concluded that DEET, Skin-So-Soft and the pyrethrum coil were effective repellents but that Citrosa gave no protection at all, whether placed around the person, or rubbed on the skin or ground up in a water slurry and poured on. "We believe the advertisements on the Citrosa plant are false," state Cummings and Craig in their paper, "The Citrosa Plant as a Mosquito Repellent?--Failure in Field Trials in Upper Michigan," published in the *Vector Control Bulletin of the North Central States*, Vol. 4, No. 1 (1995): pp. 16-28. Studies done by USDA-ARS Medical



and Veterinary Entomology Research Lab scientists in Gainesville, Florida, do not support claims that Skin-So-Soft is effective as a mosquito repellent under "real-world" conditions; differences in experimental protocols and definitions of "effective" play a large role in interpreting findings of efficacy studies, and efficacy studies should be very critically evaluated before placing any reliance on their recommendations when there is a significant risk of vector-borne disease. ---- *Florida Mosquito Control Buzz Words*, April 1995, p. 1.

Common Findings for Both In-House and Contract Activities - Some of the findings from the Environmental Compliance Evaluations of Navy pest control programs are listed below. A quick review of this list could help other shops improve their pest management facilities and programs.

1. Label missing from pesticide container
2. Improper storage of different types of containers
3. Pesticide spills on floors and shelves
4. Flammable pesticides not stored in flammable locker
5. Food in mixing and storage areas
6. Ashtray with cigarette butts in storage and mixing room
7. Respirator and cartridges stored in mixing room
8. Spill Plan and Evacuation Plan not in pest control shop
9. Carpet and wood in storage room
10. Improper disposal of pesticides
11. Re-use of empty pesticide containers
12. Pest management records not on file
13. Copy of contractor's business and certificate missing or expired
14. Depredation permit not on file
15. Pest Management Plan not signed by the Commanding Officer
16. Pest Management Plan not reviewed annually
17. USDA number on a product
18. Products that are not labeled
19. Canceled products on shelves
20. Pest Management Plan not reviewed by NAVFACENGCOM PMC/Pest Management Professional.

---- Mr. William Gebhart, NAVFACENGCOM.

The Search for Safe, Effective Alternatives to Methyl Bromide - Methyl bromide has been the cheap, fast, and easy-to-use chemical answer for many infestation problems for a long time. It has been used for termite control, to protect stored commodities, to fumigate packing material, as a soil fumigant to control weeds, insects, fungi and bacteria, to protect produce and grain from infestation, and as a fumigant for crops destined for export to meet quarantine requirements of importing nations. But by the end of the century, this picture will change.

The US has signed an international accord, the Montreal Protocol, mandating reduction or elimination of production and use of ozone-depleting chemicals, and the US Clean Air Act calls for halting manufacture of ozone-depleting compounds by the year 2001. Methyl bromide is on the list with other compounds similarly linked to ozone depletion.

These events have stimulated ARS scientists at labs around the country to seek alternative ways to disinfect soils and stored crops, and to examine methyl bromide's fate when used as a fumigant. Here's what scientists at three labs are doing to help lessen reliance on methyl bromide:

Researchers at the ARS Horticultural Crops Research Laboratory in Fresno, CA, are trying to control stored product-infesting moths, such as the navel orange-worm, codling moth, and Indian meal moth, by making life inside the storeroom too cold, infecting the pests with a virus, changing the air around them into a mix of gases they can't tolerate, or combinations of these tactics. The tactics they are testing on stored walnuts would be applicable to other commodities as well, like almonds and pistachios. Some of these same tactics might be readily applied to sun-dried fruits like raisins, apricots, prunes, etc.

To control navel orangeworms that may have been hiding in the walnuts when they came in from the orchard, the scientists placed field bins full of walnuts in a small, airtight storeroom, then pumped in nitrogen until the air had only four tenths of 1 percent oxygen. Ambient air has about 21 percent oxygen. After seven days in this modified atmosphere, no navel orangeworms survived.

To control Indian meal moths in the storeroom, the bins were separated into groups that were either chilled to 50 degrees F, surrounded by air containing only 5 percent oxygen, or treated with a natural virus that infects Indian meal moths but is harmless to humans and other organisms. For the next several weeks, the scientists released Indian meal moths in the chamber. Two and one-half months later, there was slight insect damage to the virus-treated walnuts, but those held at 5 percent oxygen or at 50 degrees F were undamaged.

The team performed a second test last fall and is now scrutinizing the results and tabulating costs. They are predicting that a combination of treatments would be most effective. These tactics are likely to be more expensive than simply fumigating with methyl bromide, but more environmentally acceptable.

A mix of heat and cold is being studied to control moths in dried fruits. Prune packers currently fumigate the processing plant with methyl bromide once the harvest is brought indoors. ARS researchers are testing an alternative: convert the large methyl bromide chambers to heating and cooling rooms. Use heat instead of methyl bromide for a quick kill of insects that might be concealed in the prunes. Then, throughout the fall and winter, use cool night air to keep the prunes at about 50 degrees F until they're ready to pack and ship.

Low temperature is a good way to prevent infestation, but it takes a long time to kill the insects. If you

use heat first, you have a fairly quick treatment, and the following night air recirculation, which uses little energy, should keep the prunes insect-free. They can kill Indian meal moth eggs in three weeks at 50 degrees F but it may take more than five weeks to kill the adults. They are trying to find out exactly what happens to the moths if heat is used for a few days and then low temperatures for a few months. The ARS scientists are trying to fine-tune this strategy. To streamline cooling and keep energy costs low, they are collaborating with an agricultural engineer from the University of California, Davis.

Another ARS researcher is testing a range of controlled atmosphere environments to find the precise mix of gases that controls warehouse pests but does not damage the stored product. For example atmospheres with 5 or 6 percent oxygen are less expensive to use for long-term storage than those with four-tenths of a percent. Because controlled atmosphere storage is more costly than methyl bromide, scientists are trying to determine the most cost effective way to use it.

Another investigator is following the lead of ARS researchers elsewhere who have had remarkable success in releasing beneficial insects into silos. The beneficial insects seek out and kill unwanted ones. They find candidates for this natural warfare in a "fig dump," a mountain of figs rejected at a nearby packinghouse as not perfect enough for humans but which are used as an addition to cattle feed. "The fig dump is a very entertaining place, if you're an entomologist," says the scientist, "because it's teeming with both pests and beneficial insects." The beneficials could search out unwanted insects that may be hiding in crevices or cubbyholes at the warehouse. The best candidate in this study is the parasitic wasp *Habrobracon hebetor*. The females sting and paralyze Indian meal moth larvae, laying eggs on the immobilized worms. Wasp offspring then hatch from the eggs and kill the larvae by feeding on them. Further foraging at the fig dump may reveal other promising protectors.

Methyl bromide is used for fresh produce like apples, and even highly perishable soft fruits like nectarines and cherries. In the Pacific Northwest, growers fumigate about $35 million worth of sweet cherries every year for export. To discover the best mix of treatment options for exporters, an ARS scientist at the ARS lab in Yakima, Washington, and a university researcher from the University of California at Davis have developed a technologically sophisticated fruit treatment system.

Their controlled atmosphere/temperature treatment system (CATTS) adjusts temperature, humidity, atmospheric gases, and air speed from an office or lab computer. Using CATTS is saving months of time because the researchers can examine more possibilities faster than ever. The two research prototypes, which resemble oversized home freezers, are sized to accommodate standard farm field boxes.

A study by the scientists compared two different temperatures for treatment of cherries infested with codling moths, 113 and 117 degrees F, with and without specially altered atmospheres. Heating the fruit to 117 degrees F and simultaneously using CATTS kills all the codling moths in only 44 minutes, about half as long as it takes to kill them using heat alone. Heat makes the insects breathe faster and need more oxygen, but the CATTS doesn't contain enough oxygen to keep them alive. This treatment isn't perfect, because there is some softening of the fruit, but the combination of heat and CATTS is promising. Researchers plan to begin to look at different heat-plus-CATTS combinations next.

While some researchers probe for alternatives to methyl bromide's indoor uses, an ARS soil scientist at Riverside, California, is exploring its outdoor work as a fumigant, looking for ways to reduce emissions into the atmosphere. Soil fumigation now accounts for about 85 percent of the methyl bromide used in US agriculture. Without methyl bromide, producers of crops like strawberries, tomatoes, peppers, and eggplant might lose a portion of their harvest. Those crops and others, including grapes, citrus, nuts, forest tree seedlings, and ornamental trees are usually planted only after soil has been sterilized with methyl bromide.

It is estimated that unless viable alternatives are found, losses to US agriculture could total as much as $1.5 billion annually. Collecting data on how much methyl bromide actually gets into the atmosphere is important to gaining an understanding of its atmospheric effects. According to a preliminary study by the ARS Pesticide and Water Quality Research Unit, soil fumigation appears to release less of the compound into the air than was previously thought. Their findings suggest that only 40 percent of the methyl bromide that is injected into the soil escapes, contrasted with releases from other sources, which have been as high as 90 percent. The Montreal Protocol assumed emissions were 50 percent, based on a computer model.

For the ARS experiment, growers' procedures were reproduced. The chemical was injected into the soil with tractor-borne nozzles, where it quickly vaporizes. On two 10-acre plots, the chemical was applied 10 inches below the soil surface, just like strawberry growers do, then the surface was sealed with a clear plastic tarp for five days. On a second, untarped, 10-acre plot, the chemical was pumped down 27 inches, the tactic growers use when replacing an old vineyard or orchard with young trees. To capture and measure escaping methyl bromide, three different techniques were used, requiring some 60 different probes or other instruments. This was apparently the first time that anyone had accounted for 100 percent of methyl bromide fumigant under real farming conditions. Next, the scientists will compare different ways to apply the chemical and the effect that the application methods have on the fate

of methyl bromide. ---- *Agricultural Research*, pp. 14-18, JAN 95.

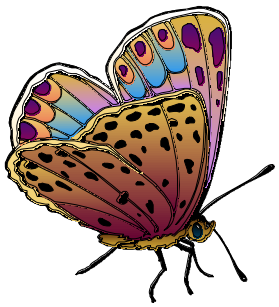
Octenol Fails Stable Fly Attractancy Test - A recent study designed to determine if blue targets were attractive to stable flies (*Stomoxys calcitrans)*, if octenol, a natural component of cow breath, enhanced attraction, and whether treating the targets with insecticide might enhance stable fly control in Southern California dairies, produced some interesting results.

Alsynite fiberglass reflects ultraviolet wavelengths that are attractive to stable flies, and traps made from this material have been widely used for sampling. The smooth, hard surface is poorly suited for pesticide applications, but at least two studies have shown local reduction of stable flies with insecticide-treated alsynite traps. Tsetse flies in Africa are attracted to pesticide treated targets of blue fabric baited with cheap, stable attractants such as cattle urine and 1-octen-3-ol (octenol), a natural component of cow breath. Such traps can reduce tsetse fly populations. Recent African studies have also shown that blue-dyed fabric attracts three times as many stable flies as does alsynite fiberglass; the addition of octenol nearly doubles the number of flies caught. The present study was designed to determine whether blue targets are attractive to stable flies, whether octenol enhances attraction, and whether treating these targets with insecticide might enhance stable fly control.

Stable flies clearly detected octenol in prior laboratory electroantennogram experiments in England, but these studies did not assess whether the response was reflected behaviorally. The results of this study do not support the contention that *S. calcitrans* are attracted to octenol at this rate, as was shown in Africa. However, the African studies used targets that were remote from livestock, and it is quite possible that in the present studies effects of artificial host odors such as octenol were overpowered by the close proximity of large numbers of cattle.

In this study, the blue cylindrical cloth targets treated with insecticides attracted resting stable flies, but octenol did not increase this attraction to the targets, and the targets did not result in fewer flies in treated dairies, possibly due to insecticide resistance in the studied flies and the relatively small proportion of flies attracted. In some settings, such as pasture-type dairies with lower concentrations of animals, targets might still be useful. ---- *California Agriculture*, Vol. 49, No. 2, pp. 16-18.

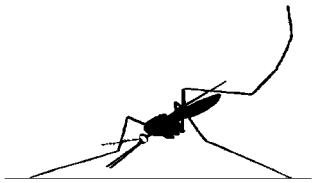
Bt Toxicity to Nontarget Lepidoptera - The bacterium *Bacillus thuringiensis* Berliner var. *kurstaki*, which is used extensively in aerial sprays for control of forest defoliators such as gypsy moth, *Lymantria dispar* (L.), and western spruce budworm, *Choristoneura occidentalis* Freeman, has a short half-life in the field (1-3.5 days, with up to 20 days detectable residual activity in various ecosystems), which is believed to minimize its impact on nontarget Lepidoptera. Due to increasing concern over the immediate and long-term effects of the widespread aerial application of this microbial insecticide, the authors of the article examined the toxicity and persistence of *B. thuringiensis* to larvae of tree-feeding swallowtail butterflies *(Papilio glaucus* L. and *P. canadensis* Rothschild & Jordan) and the promethea moth, *Callosamia promethea* (Drury), on seven of their natural host plants. *B. thuringiensis* applied to trees at a rate of 40 BIU/ha with a backpack sprayer equipped with a rotary atomizer Micronair[R] nozzle was toxic to early and later (fourth) instars, regardless of the host larvae were feeding on. Long-term persistence of *B. thuringiensis*



on potted tulip trees placed in exposed or below-canopy locations monitored at 0, 10, 20, 30, and 40 days after the spray showed toxicity to early-instar *P. glaucus* persisted for up to 30 d in field studies during 1992 and 1993. Survival on trees sprayed with *B. thuringiensis* tended to be lower in below-canopy locations, but differences were not always significant. The results of their studies indicated that *B. thuringiensis* sprays are toxic to some nontarget lepidopterans for at least 30 days after spraying. ---- *Environ. Entomol*. 24(2): 288-297 (1995).

MEDICAL ENTOMOLOGY

Locally Transmitted *Plasmodium vivax* Malaria in An Urban Setting - The April 21, 1995 Morbidity and Mortality Weekly Report (MMWR) summarizes an investigation of three persons who acquired



Plasmodium vivax infection in Houston, Texas, by presumed mosquito-borne transmission during 1994, and actions taken to improve malaria control efforts in the urban area. All three infections were acquired in the summer of 1994; two of the three cases were diagnosed in July 1994, and the remaining one in December 1994. All recovered after treatment with chloroquine and primaquine. Two of the case-patients had never traveled outside the United States, and the remaining patient had not traveled outside the United States since 1956. None had a history of blood transfusions, tattoos, malariotherapy for Lyme disease, recent drug use, or previous malaria infection. They lived within a 3-mile radius, were not acquainted, and had not

been in the same locations. However, all had prolonged nighttime exposure to mosquitoes, either through working outdoors at night or sleeping in housing without window panes and/or with unscreened windows and doors. They lived 10 miles from the nearest international airport, and prevailing wind conditions in Houston make it unlikely the anophelines were carried beyond their maximal flight range of 1-2 miles.

The Harris County Mosquito Control District identified adult female *Anopheles quadrimaculatus,* a competent vector of malaria, in mosquito traps placed near the residences of patients 1 and 2 on August 4. Although possible breeding sites were identified near these residences, mosquito larvae were not found. Rainfall was below average during July-August, and many potential breeding sites were dry.

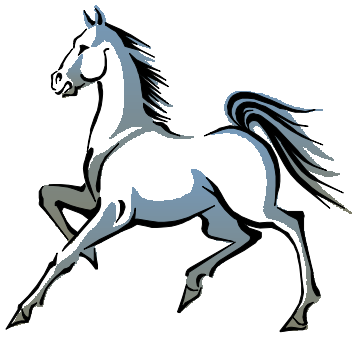
The findings of the Houston investigation indicate that the *P. vivax* infections for all three patients most likely were acquired locally (in Houston) as the result of mosquito-borne transmission. The course of illness in case 3 strongly supports mosquito-borne transmission and possible secondary transmission. Airport malaria (i.e., inadvertent transportation of infective anophelines on airplanes) is unlikely.

This cluster of patients with locally acquired *P. vivax* malaria in an urban setting occurred one year after identification of an outbreak of locally acquired *P. falciparum* infection in New York City. Local transmission in densely populated areas represents a change in the epidemiologic pattern of malaria: until 1991, when transmission was reported in a suburban area of New Jersey, local transmission had occurred predominantly in rural areas. Although malaria is a notifiable disease in all states, only seven (29%) of the 24 cases identified in this investigation had been reported to the health department in Houston. The lack of reporting of and information about these cases delayed the investigation and efforts to identify other possible locally acquired cases. For example, the two cases in persons who had traveled only to northern Mexico may have been either imported or locally acquired; however, because they had not been reported, they were not investigated promptly. In addition, though most hospital laboratories have the capacity to conduct malaria smear examinations, limitations in the experience of staff may decrease the likelihood of detection.

To improve surveillance of all notifiable conditions, the Texas Department of Health has begun an educational campaign and is implementing an enhanced toll-free telephone reporting system aimed at all health-care practitioners. In addition, the Houston Health Department has distributed newsletters to physicians and infection-control practitioners informing them of the locally acquired cases, the proper treatment for cases, and the importance of reporting. The Harris County Mosquito Control District will enhance vector surveillance for anopheline vectors, which will be linked to active malaria case detection this summer.

Malaria continues to be a leading cause of morbidity and mortality worldwide, particularly because of the development of drug-resistant strains, and is a continuing concern in the United States because of increased international migration, travel, and commerce. The basic requirements for local transmission of malaria exist in many areas of the United States: persons (who may or may not be ill) with malarial gametocytes in their blood (as was documented in Houston), competent vectors, and conducive weather conditions. Important strategies for preventing the reestablishment of malaria as an endemic disease in the United States are prompt recognition and reporting of cases of malaria; appropriate treatment of all malaria cases, including primaquine for *P. vivax* and *P. ovale* infections to prevent relapses; and implementation of appropriate control measures. ---- *MMWR* Vol. 44, No. 15 (April 21, 1995), pp. 295, 301-303

Where Does EEE Go in the Winter? - Eastern equine encephalitis (EEE) virus has presented a number of epidemiological puzzles for mosquito biologists to solve since its detection as a distinct etiologic agent from a New Jersey horse during the 1930s. This led to a series of field investigations along the eastern seaboard that implicated mosquitoes as vectors, identified wild birds as reservoir hosts and ultimately identified *Culiseta melanura* as the enzootic maintenance vector. Despite a series of documented human outbreaks of the disease in Massachusetts, EEE was regarded as a veterinary problem in New Jersey until the devastating 1959 outbreak that occurred along the New Jersey coast. Since that time, *Aedes sollicitans* has been targeted as the primary vector to humans and *Coquilletidia perturbans* has emerged as the most important mosquito in transmission to horses. The overwintering mechanism utilized by EEE has been the subject of continued controversy but has remained an enigma to this point in time.



In the early 1970s, the Centers for Disease Control constructed a schematic diagram for the seasonal cycle of

EEE based on research findings that had been published on the topic. The diagram reveals that approximately half the cycle is speculative because EEE virus disappears from the Atlantic flyway when birds migrate south and does not reappear until the following spring when it is amplified in young birds by *Cs. melanura*. Many researchers felt that EEE virus was carried south by migrating birds and was reintroduced to the northeast each spring by the returning migrants. Others felt that the virus remained in temperate regions during the winter months in rodents, reptiles, hibernating mosquitoes, or resident birds.

More than 20 years have passed since CDC generated that cycle and little has been added to clarify the overwintering mechanism(s) for EEE in temperate regions. Recent studies conducted at by Dr. Wayne Crans at Rutgers University using PCR technology on bird tissues may provide the answer. His evidence suggests that EEE virus may remain chronic in birds that have recovered from an overt infection. His data also suggest that recrudescence of these latent infections may be the mechanism that reintroduces the virus to mosquitoes in the spring. If this proves to be true, EEE virus overwinters in wild birds (rather than mosquitoes, frogs, or snakes) and birds infect the mosquito populations each year. This is exactly opposite what most authorities have been telling people about EEE since 1959.

Crans and colleagues obtained their evidence by sampling birds at their Dennisville study site in southern New Jersey where the mosquito population was being tested for virus on a regular basis. With this approach, they could compare virus activity in birds and mosquitoes over the same time frame. The data indicated that virus repeatedly appeared in the bird population before it was evident in mosquitoes. The evidence gathered was in three different forms: (1) captured birds that were viremic up to 51 days before the virus was isolated from *Cs. melanura,* (2) captured banded birds that had seroconverted from antibody negative to antibody positive as many as 53 days before the virus was isolated from *Cs. melanura,* and (3) a single captured bird with an early spring viremia a year after it had tested positive for EEE antibodies. Each of these events suggested that the virus was originating in birds and that the birds were passing the infection on to the mosquitoes.

Careful examination of the data revealed that all the birds that became viremic before the virus reached the mosquito population were permanent resident and summer resident adult birds. This meant that all the birds that circulated virus before there was any indication of mosquito involvement had lived at the study site through at least one prior epiornitic year. If the infection was coming from an unknown vertebrate reservoir, it should have infected juveniles as well as adults. If the virus was being transmitted by an unknown arthropod vector, it should, likewise, have affected juveniles as well as adults. If the virus were coming north with migrant birds from the south, it would have occurred in transients and summer residents but not in permanent residents that never left the study site. If the virus were being maintained transovarially within the *Cs. melanura* population, it would not have appeared in birds before it showed up in the mosquito population. The only plausible explanation was that the early season virus recrudesced in birds that had latent virus in their tissues from a prior infection.

Examination of the birds that seroconverted from antibody negative to antibody positive gave a similar scenario. All the early season seroconversions occurred in permanent resident and summer resident adult birds that had lived at the study site during at least one prior epiornitic year. This would preclude unknown reservoirs, unknown arthropod vectors, transovarial mechanisms, and introduction from the south. The data suggested that resident and summer resident birds might be harboring chronic infections of EEE that recrudesced during the rigors of the breeding season.

The single viremia that Crans' team detected in a bird that had antibodies the year before gave the strongest evidence that previously infected birds might harbor chronic infections that resurface at a later date. The bird in question was a male Gray Catbird that had a PRNT titer of 1:20 to EEE virus on May 13. This same bird was recaptured on June 8 of the following year with an active viremia. The first indication of virus in *Cs. melanura* occurred by July 15 (37 days after the viremic capture date). This summer resident apparently contracted EEE at the study site and migrated south at least once before researchers had any contact with it. They captured it shortly after it returned north for the breeding season and took a blood sample which documented antibodies. The bird flew south that fall and returned to re-nest the following spring. Crans was fortunate enough to recapture it in early June during an apparent relapse.

Armed with indirect evidence that birds might be the long sought winter reservoir for EEE, Crans entered the 1993 season with federal and state permits to euthanize selected bird species for PCR analysis of numerous organ tissues for latent virus. He obtained permission to sample Carolina Chickadee, Eastern Tufted Titmouse, and Blue Jay (permanent residents that rarely leave the study site) and Wood Thrush, Ovenbird, and Gray Catbird (summer residents that nest at the study site but winter in tropical areas). The Crans team took blood samples from all the birds they collected from November 1993 to July 1994. They euthanized the species they had permits for and saved the organs for PCR tests for latent virus.

Their results to date show that 52 percent of permanent residents and 71 percent of the summer residents yield a positive test for EEE in at least one tissue. Positive tests have been obtained from heart, liver, lung, brain, and blood. The tests indicate that EEE persists during the winter months in a variety of avian tissues. The tests also indicate that EEE even appears in the blood of birds throughout much of the year. Bird tissues from this study have been sent to the University of Maryland to determine infectivity. The results, to date, suggest that tissues that test positive by PCR do not produce virus that is capable of infecting cells in tissue culture. Whether or not this is latent virus (as originally suspected) or some by-product that is left behind by the viral RNA is unknown at this time. Evidence has been obtained of persistence of EEE virus in a variety of bird tissues but it is too early to claim that the material is capable of recrudescing and reinfecting mosquitoes.

The Rutgers scientists hope to continue their studies and test bird bloods as well as tissues during a period when they can document that EEE virus is actually entering the local *Cs. melanura* populations in late spring. Until then, they cannot claim that they have discovered where EEE goes in the winter, but they can claim to have evidence to suggest that resident birds may be involved in the overwintering cycle. ---- *Vector Ecology Newsletter* 25(4): 7-9.

***Aedes aegypti* Mosquitoes Found in Tucson** - In September 1994, entomologists at the University of Arizona identified *Aedes aegypti* mosquitoes in samples that were collected and submitted by a man in Tucson. Pima County Vector Control staff visited the area to look for mosquito breeding sources and to set out carbon dioxide traps in a number of locations around the city. A few more *Aedes aegypti* mosquitoes were collected in a second location approximately three miles from the first collection site. *Aedes aegypti* eggs or larvae may have been transported and introduced into Arizona in containers on vehicles traveling across country from the southeastern states or possibly from Central America. Once introduced, this mosquito can establish local breeding populations as long as urban breeding sites are available and as long as temperatures remain warm. The Tucson population of *Aedes aegypti* mosquitoes is not expected to survive the winter since temperatures frequently drop below 40°F. Nevertheless, Pima County and VBZD staff plan to conduct mosquito surveys in the Tucson area next spring and summer. ---- *Vector Ecology Newsletter* 25(4): 13.

Dengue Case Confirmed in Santa Cruz County, California - In mid-August of 1994, a 15-year-old male resident of Santa Cruz County developed an illness characterized by acute onset of fever, headache, and rash. His symptoms appeared one day after returning from a trip to Puerto Rico where he recalls being bitten by mosquitoes. He consulted a local physician, and acute and convalescent blood samples were obtained and submitted to the CDC Laboratory in Puerto Rico. Serologic tests came back positive for dengue. The patient made a complete recovery with symptomatic treatment. ---- *Vector Ecology Newsletter* 25(4): 13.

Vaccine Against Borrelia to be Tested in Sweden - A vaccine against tick-transmitted borrelia infections (the European equivalent of Lyme disease) will be tested next summer on the island of Aland, a Swedish speaking province of Finland in the Baltic Sea. The vaccine will be tailor-made for the particular borrelia bacteria found on Aland. If these tests show good results, the next step could be a Swedish tailor-made vaccine against borrelia bacteria on the east coast of Sweden.

Ticks can be carriers for both viruses and bacteria and in Sweden at least two sicknesses are known to be transmitted to humans by tick bites. One is tick-borne encephalitis (TBE), a meningitis caused by virus, that already has an effective vaccine. The other is the borrelia infection caused by bacteria. It can be treated with antibiotics, but a vaccine is only now being developed.

"The big question has been why a person who has had a borrelia infection is not immune from recurring borrelia infections. A person who has been infected can have antibodies against the bacteria in the blood, but still does not have protection against new infections," says Rolf Gustafson, physician for epidemic sicknesses at Huddinge Hospital (Stockholm, Sweden).

Researchers have now discovered that the bacteria have "appearances" affected by their habitat. The proteins in their surface structure can vary from place to place and an infection can give protection against bacteria with one type of surface structure, but not against one with a different surface structure.

Moreover, there seem to be some bacteria with a surface structure that causes fewer cases of sickness, which may explain why one bite out of one hundred gives borrelia infection, in spite of the fact that about 20 percent of the ticks are carriers of the bacteria.

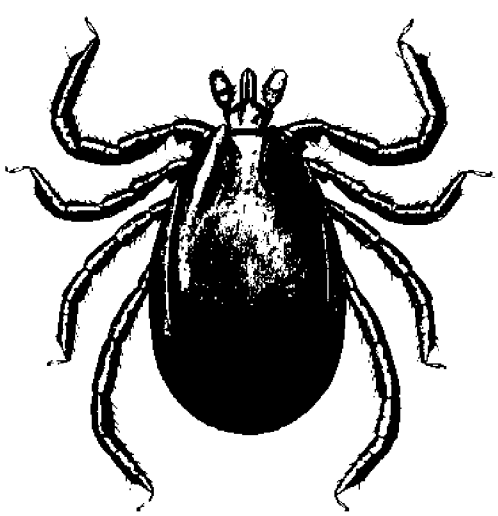
Another explanation may be that the borrelia sickness is not transferred until at least 48 hours after the bite, and that the tick can be discovered during this period of time and removed.

An experimental vaccine, which is being produced by the same Austrian company that made the TBE vaccine, consists of a "cocktail" of the different surface proteins from the bacteria isolated on the island of Aland. It has not

shown any secondary effects in tests on animals, but to substantiate this conclusion, the first phase of the test on humans will include only about ten people. The next phase will include about 50 people in order to determine the size of dosage, and if the results of all these tests seem promising, then all the people on the island of Aland, who want to can be vaccinated.

The next step is to produce a Swedish vaccine, which will be tested in a limited area. "If all of these tests work out well, we can have a vaccine against borrelia on the market in four or five years," according to Gustafson.

The borrelia infection is often recognized by the classic ring of redness that spreads out around the bite. The infection can spread to the nervous system and can cause



meningitis with symptoms of tiredness, headache, and fever. The sooner the infection is treated with antibiotics the better the prognosis for recovery. Even with delayed treatment borreliosis can be cured, but sometimes it takes a long time, especially if the infection spreads to the joints in the body.

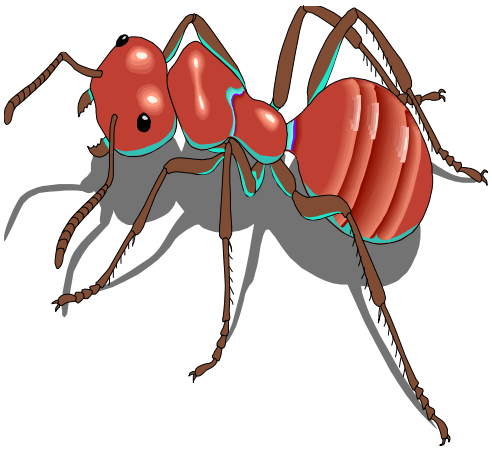
This year's total of cases of borrelia infection (in Sweden) is not complete as yet, but it looks as though the number of cases is the same as in earlier years: about 70-80, all in areas that are well known for having ticks with the TBE virus. These areas mainly include certain parts of the Stockholm area, for example, Sodertorn, Sodertalje, Adelsound, Munso. Some cases have been reported even in the northern part of Uppsala province.

The number of cases has not been less this year in spite of a very dry summer, which should have limited the tick population. But this has been offset by the fact that people have been outdoors more and thus exposed to the ticks that were present. And the danger isn't over yet. Ticks are active until the temperature goes down to -6° to -7° C below freezing. "It is possible to be bitten by a tick in January if the weather is mild," concluded Rolf Gustafson.

---- Kerstin Hellbom, *Dagens Nyheter* (Daily News), 16 October 1994 via: *Vector Ecology Newsletter*, 25(4): 6.

Recent Entomology Research Findings from the USDA's Agricultural Research Service Laboratories in Gainesville, Florida

Fire Ants



These pests have a healthy appetite--bad news for the ecosystem. Entomologists Sanford Porter and Thomas Macom found that a moderate to high infestation of fire ants--about 14.5 million workers per hectare--needs about four kilograms of energy to sustain itself during a typical summer week. This is based on lab studies in which the scientists fed 30 fire ant colonies crickets and sugar water each day. The implication: the omnivorous fire ants will continue to cause environmental damage because of their appetite for crops, native ants, small animals--anything they can get. Contact: Dr. Sanford Porter, (904) 374-5914.

The most promising biocontrols for fire ants continue to be in South America--the home of the species *Solenopsis invicta*, which infests about 200 million acres in 11 southern states and Puerto Rico. The organism *Thelohania solenopsae*, a microsporidium from Argentina, is the most common disease of fire ants in that country. In field tests there, colonies infected with *T. solenopsae* were 67 percent smaller than healthy colonies. That's partly because the pathogen slowed fire ant reproduction and development: in infected colonies, it took four months longer for males to reach the adult stage. Also, after three years there were 85 percent fewer colonies in *T. solenopsae*-infected area. Field studies in South America are continuing and lab studies at Gainesville are planned for 1995 and 1996. Contact: USDA Fire Ant Research Group, (904) 374-5910.

What chemical scents govern fire ant mating? Scientists are now a step closer to finding out. Chemist Robert K. Vander Meer found that males and potential queen fire ants release chemical cues that excite and attract

workers during mating flights. The next step: to isolate these chemicals and incorporate them into baits targeted only for fire ants--not for harmless ants, animals or other wildlife. Contact: Dr. Robert K. Vander Meer, (904) 374-5918.

Mosquitoes

Microsporidia also show promise as biocontrols for mosquitoes. Juan Garcia and James Becnel have identified eight new species from Argentina--the first such organisms ever described from that country. The microsporidia are species of *Amblyospora* and *Parathelohania* from various mosquito hosts. Meanwhile, scientists are continuing field tests of another exotic microsporidium, *Edhazardia aedis*, against the yellow fever mosquito *Aedes aegypti*. In preliminary laboratory tests, the reproductive capacity of females infected with *E. aedis* was reduced by 98 percent, compared to healthy females. Contact: Juan Garcia or Dr. James Becnel, (904) 374-5930/5961.

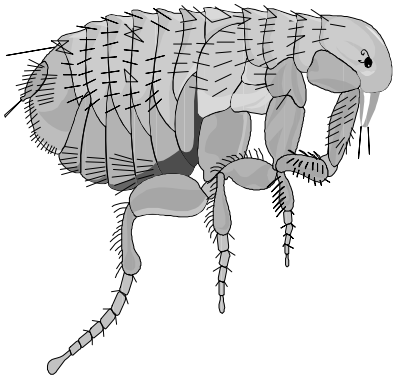
One stumbling block for using *E. aedis* against mosquitoes is that the organism cannot survive cold or water loss. Entomologist Albert Undeen has found that the death of *E. aedis*'s reproductive spores is marked by a loss of sugars the spores need to germinate. He's devised a simple test to measure sugar levels in stored spores to see if they are viable. This will help researchers studying this potential biocontrol organism. Contact: Dr. Albert Undeen, (904) 374-5966.

DEET insect repellent is effective for up to two hours against the imported Asian tiger mosquito, *Aedes albopictus*. That finding is based on tests by scientists Donald Barnard, Carl Schreck and Rui-de Xue with a 25 percent DEET solution applied to the skin. For hungry females--those that hadn't had a blood meal--repellency ranged from 4.5 to 1.9 hours, depending on their size and age. The mosquito breeds in standing water found in old tires, bird baths, clogged gutters and other containers. It has the potential to spread dengue, encephalitis and other viral diseases to humans. Contact: Dr. Donald Barnard, (904) 374-5930. **TIB NOTE: The current DoD issue insect repellent is 33% DEET, not 25%.**

Ticks

DEET doesn't offer long-term protection against the tick that spreads Lyme disease, based on preliminary lab studies. Scientist Carl Schreck tested DEET and 29 other repellents against two ticks--the lone star tick, *Amblyomma americanum*, a major pest, and the deer tick, *Ixodes scapularis*, which transmits Lyme disease. The repellents were applied to the hands of three volunteers and then exposed to the ticks. DEET and ten other repellents were effective for up to four hours against the lone star tick. But none of the repellents warded off deer ticks after one hour, and most weren't effective for more than ten minutes. Schreck said that if outdoor studies confirm lab tests, new, more effective repellents will be needed to control ticks that can spread Lyme disease. Contact: Dr. Donald Barnard, (904) 374-5930. **TIB NOTE: This emphasizes the importance of permethrin impregnation and proper wear of the uniform.**

Fleas



Repellents are getting another look against cat fleas. Scientist John Klotz and colleagues tested potential repellents and found that the most effective was fencholic acid, which reduced flea bites by more than 85 percent for 20 days in lab tests. He's also testing boric acid as an insecticide against cat fleas and against ants, including carpenter, ghost, and pharaoh ants. A key advantage of boric acid: it's effective at very low concentrations of one percent or less. Contact: Dr. John Klotz, (904) 374-5989.

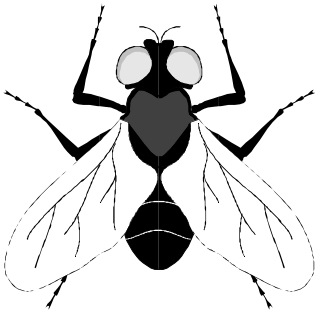
An insect growth regulator called pyriproxyfen also shows promise for controlling cat fleas. At concentrations of only 0.025 percent, pyriproxyfen reduced fleas by 80 percent over seven months after being sprayed on infested carpeting. It's effective at much lower rates than fenoxycarb or methoprene, two insect growth regulators that are currently registered for flea control. Pyriproxyfen is near EPA approval, pending studies on how long its residues persist. Contact: Maj Carpenter, (904) 374-5950.

Flies

Two strains of a natural fungus keep house flies grounded. Entomologist Christopher J. Geden found that spraying two isolates of the fungus *Beauvaria bassiana* on house flies killed more than 90 percent of the pests in lab studies. The pathogen naturally infects house flies, but most strains of the fungus don't cause high mortality rates. Researchers say the two tested strains are an exception. Further research is focusing on finding the best bait mixture for feeding the fungus to flies. Contact: Dr. Christopher J. Geden, (904) 374-5919.

One stumbling block to using biological control is that beneficial insects themselves are often susceptible to diseases. For example, entomologist Christopher J. Geden

and colleagues found that a parasitic wasp of flies was infected by a debilitating microsporidium disease. To rid the parasitic wasps of the disease, the researchers heated the wasp eggs to 117 degrees F for up to 45 minutes. The result: the disease rate was cut 93 percent--and the disease-free parasites killed 10 times as many house and stable flies as infected parasites did. The scientists are alerting insect rearing companies so that they can use the procedure to ensure wasps are raised disease free. Contact: Dr. Christopher J. Geden, (904) 374-5919.



The black dump fly, *Hydrotaea aenescens*, eats house fly larvae and is a prime biocontrol candidate for house flies. Entomologist Jerome A. Hogsette has devised a device that collects *H. aenescens* eggs, which can then be placed on artificial diets for rearing. Until now, rearing this house fly predator has been difficult. Now scientists can raise the predatory flies on a diet of meat, bone meal and other foods, providing a supply of flies to test in biocontrol studies on livestock and poultry farms. Contact: Dr. Jerome A. Hogsette, (904) 374-5912.

Attractants

A new trap uses a chemical lure, based on food odors, and a visual cue to lure Medfly pests. The trap could replace current protein baits, which are expensive, difficult to handle and don't have high catch rates. Another bonus: The new trap can be "tuned" to lure females before they mate and lay eggs in fruit. In Guatemala field tests, up to 65 percent of the females caught in the trap had not yet mated--compared to 22 percent in the conventional, protein-bait traps. The new traps also did a better job of trapping Medflies without attracting other non-target insects. The active bait ingredients in the new trap are ammonium acetate and putrescine. ARS is seeking a patent on the trap. Contact: Robert R. Heath, (904) 374-5735

A new chemical component of the Indian meal moth's sex pheromone has been identified. Insect physiologist Peter Teal said the discovery is important because it helps define the exact blend of chemicals female moths use to attract mates. Teal and colleagues isolated and identified the chemical, which can be used to develop synthetic pheromones to monitor and catch moths. The Indian meal moth is one of the most serious pests of stored grain worldwide. Alternatives for controlling the moths are needed, because many insecticides are no longer permitted for stored grain. Contact: Peter Teal, (904) 374-5788

One way a parasitic wasp finds its caterpillar prey is by sensing a chemical in the caterpillar's feces. Chemist James Tumlinson, entomologist Joe Lewis and colleagues discovered the chemical and say it has been extracted and used to teach laboratory-reared parasitic wasps to find corn earworms, which cause millions of dollars in damage to a variety of crops. The chemical, called a kairomone, is present only in feces of caterpillars that the wasp attacks. In lab tests, the researchers used the kairomone from corn earworms to train *Microplitis croceipes* wasps to search for the earworms themselves. These wasps would not respond to kairomones from other caterpillars. The finding is part of an ongoing study of the behavior of parasitic wasps that can be used as alternatives to insecticides for controlling corn earworms and related pests. Contact: James Tumlinson, (904) 374-5730, or Joe Lewis, (912) 387-2369

Another way parasitic wasps find their prey is by tracking chemical "distress-signals" that plants emit when pests feed on the plants. Scientists used special growth chambers to measure these chemicals in five domestic cotton varieties and one wild cotton plant from the Florida Everglades. Beet armyworm caterpillars fed overnight on the plants, then researchers measured the “distress-signal” chemicals emitted. The scientists found that the caterpillars preferred not to feed on the wild variety. But when the caterpillars did feed on the wild cotton plant, the “distress-signal” chemicals increased by sevenfold, compared to the five domestic cotton varieties. Scientists say breeders could develop new varieties that caterpillars don't like--or that emit higher levels of “distress-signal” chemicals to lure parasitic wasps to the rescue. Contact: James Tumlinson, (904) 374-5730, or Joe Lewis, (912) 387-2369

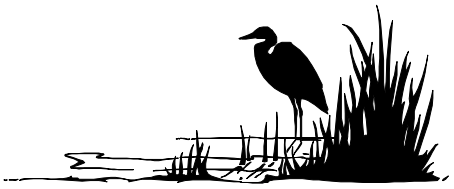
For the first time, scientists have demonstrated that some chemicals boost an insect's neurophysiological and behavioral response to sex pheromones. Entomologist Marion S. Mayer, working with chemist Robert E. Doolittle, says these chemicals greatly enhance male cabbage looper and corn earworm moths' ability to detect a female's sex pheromone. The findings could lead to improved control methods--insect mating disruption, for example--against moths that damage field and vegetable crops. Alternatives are needed to pesticides because of environmental concerns and because many species have become resistant to pesticides. Contact: Marion S. Mayer, (904) 374-5752

One way to control insects that feed on stored grain is to disrupt their reproduction. Insect physiologist Paul D. Shirk and colleagues are exploring this route by examining how the female Indian meal moth forms her eggs. This pest can cause considerable losses to stored wheat, corn, and other grains--and could become more troublesome if the fumigant methyl bromide is restricted. The scientists found that the egg itself plays a key role in shutting down yolk development and starting the formation of membranes that

surround the egg and protect it. They want to build on these preliminary findings and devise ways to impede egg formation, perhaps by turning off yolk development prematurely, or stopping the protective membranes from forming. Contact: Paul D. Shirk (904) 374-5720
---- "Entomology Research Briefs," April 1995, by Sean Adams, ARS Information, 6303 Ivy Lane, Room 435, Greenbelt, MD 20770, telephone (301) 344-2723, fax (301) 344-2311, e-mail sadams@asrr.arsusda.gov. For detailed technical questions on the research, contact the scientist at the number listed.

NATURAL RESOURCES

News From the Aquatic Weed Front - *Egeria densa*, an aquatic weed from Brazil that was likely introduced into the Sacramento River by an aquarium owner in the 1960s, has emerged in recent years as a major problem in the river basin's watershed. It is clogging waterways and propellers and threatening California's irrigation water delivery systems in addition to creating a nuisance for boating enthusiasts. If the weed continues growing unchecked, it could substantially impede waterflow to farms and cities.



An ARS plant physiologist who has studied *Egeria* for the past two years notes that the weed has been in the Sacramento Delta for perhaps 30 years, but only recently became a problem due to the prolonged drought of 1987-1994 which reduced flow in the river. The water moved more slowly and carried less silt, compared to more normal years when larger amounts of swiftly flowing water kept sediment suspended. Shallower, more slowly moving water heats up more quickly in the spring and stays warmer later in the fall. With less suspended sediment, sunlight penetrated deeper, and the aquatic weeds received additional light that stimulated their growth.

Egeria can double in size every four or five weeks during hot summer months. It roots in channel bottoms, and its long stems collect sediment, further slowing waterflow. Because *Egeria* grows from roots attached to channel bottoms, herbicides have to be placed in the water. Other aquatic weeds, such as water hyacinths, live on the surface and can be controlled by foliar herbicide sprays. The weed has so far established itself in several sloughs southwest of Sacramento and is spreading into other waterways. Some waterways are so clogged with *Egeria* that they look more like golf courses and are ruined for boating, swimming, or fishing, according to the USDA-ARS Aquatic Weed Control Research Unit at Davis, California. Waterfront homeowners are especially worried about their property values. Cutting, harvesting, or dredging do not provide effective or economic control.

Egeria has successfully been subdued on a 5-acre area in a delta slough with the commercially registered aquatic herbicide Komeen[R]. This contact herbicide defoliates the weed, usually down to its roots. It contains copper bound to an organic chelate that makes the copper more accessible to the weed and less toxic to algae. Approved by both federal and state environmental regulators, Komeen[R] doesn't harm fish and other native aquatic life, but it does suppress *Egeria* and two or three other exotic weed species. Unfortunately, *Egeria*'s underground rhizomes are not killed by single Komeen[R] applications, and the plant can grow back within a few weeks. So the herbicide must be applied at 3- to 5-week intervals throughout *Egeria*'s growing season, from mid to late April through the end of September.

The ARS lab estimates it would cost several hundred thousand dollars to control current infestations by applying the herbicide with power boats. They hope to cut costs in half by using tides to spread the herbicide at amounts required by the label. Ocean tides at the Golden Gate near San Francisco affect water flow 50 miles inland. If scientists can figure out when and where to place the herbicide in the complex web of waterways that make up the delta, it might be possible to harness the tides and use them rather than boats to distribute the herbicide. Injector lines could be run across a slough at some sites to release the chemical at the end of low tide, and the following high tide would push water back into the weed-infested area and hold it there for several hours. The lab also hopes to test Sonar[R], a systemic organic herbicide that has proven successful in other states. It is absorbed by aquatic weeds and prevents growth by interfering with the synthesis of pigments that protect chlorophyll. Sonar[R] is usually applied at lower rates, 10 to 60 parts per billion (ppb), compared to about 500 ppb for Komeen[R], and might control *Egeria* with only one or two applications per year. ---- *Agricultural Research*, April 1995, pp. 12-13.

TIB BYTES

Entomological Society of America E-mail Addresses - The Entomological Society of America (ESA) is officially on-line and ready to receive and send electronic mail. ESA members and nonmembers can send inquires to specific

departments at the National Office by using the following addresses:

Administration	admin@entsoc.org
Annual Meeting	meet@entsoc.org
Certification	bce@entsoc.org
Membership	mem@entsoc.org
Publications	pubs@entsoc.org
Sales	sales@entsoc.org
General Information	info@entsoc.org

Mosquito Forum - A new electronic mailing list is available for the discussion of topics related to mosquitoes (Diptera: Culicidae). The goal is to support open communication among persons interested in mosquitoes by providing an easily accessible means of information exchange. Anyone with internet access can subscribe.

Possible topics include, but are not limited to: behavior, bionomics, ecology, control, general biology, legislative/regulatory issues, mosquito-borne diseases, physiology, pathogens, sampling methods, systematics. The number and kinds of topics will largely be determined by the list's subscribers.

The list owner of Mosquito-L is John VanDyk of Iowa State University <e-mail: Jvandyk@iastate.edu>; <world-wide web: http://www.public.iastate.edu/~jvandyk>. Mosquito-L uses Majordomosoftware.

HOW DO I SUBSCRIBE TO MOSQUITO-L?
Send an e-mail message to MOSQUITO-L-REQUEST@IASTATE.EDU with the word SUBSCRIBE in the body of the message. The subject field will be ignored. If your e-mail program automatically adds your signature to the end of your message, put the word END on a separate line after the word SUBSCRIBE.

HOW DOES AN ELECTRONIC MAILING LIST WORK?
Basically, the heart of an electronic mailing list is a computer that knows who is on the list. When the computer receives a message, it sends the message to everyone on the list. For example, a message sent to the address <Mosquito-L@iastate.edu> will be sent to everyone who is currently subscribed to the Mosquito-L mailing list.

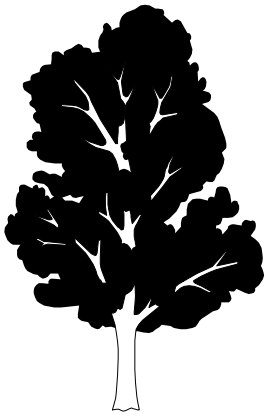
DOES IT COST ANYTHING?
There are no charges associated with Mosquito-L. Subscribing to Mosquito-L simply puts your name on the list of people who will receive messages sent to the list.

DOES IT MATTER IF I USE UPPERCASE OR LOWERCASE?
No. Mosquito-L, mosquito-l and MOSQUITO-L all look the same to the computer.

HOW DO I POST A MESSAGE TO MOSQUITO-L?
Once you have subscribed to Mosquito-L, sending a message to MOSQUITO-L@IASTATE.EDU will send your message to all the subscribers on Mosquito-L.

I CAN'T SEEM TO SUBSCRIBE TO MOSQUITO-L!
If your SUBSCRIBE message to Mosquito-L-request@iastate.edu is returned, check to make sure that you have the address spelled right. If it is spelled right, wait a day or so and try again -- it is possible that you might be experiencing network problems. If, after repeated attempts, you cannot subscribe, send e-mail to John VanDyk (jvandyk@iastate.edu) and he will try to solve the problem. ---- John VanDyk, Medical Entomology, Iowa State Univ.

PLANTS On-Line Access - A World Wide Web site is currently under development and is expected to be functional by September. Its functionality will be noted in and be accessible from the National Plant Data Center Home Page <http://trident.ftc.nrcs.usda.gov/npdc/>.



TELNET: PLANTS is accessible through Telnet to the following address:

Telnet>

plants.usda.gov

login: plants

DIAL-UP: PLANTS is also accessible via dial-up mode:

-Dial 800-633-2504 or 303-282-2958.
-Connect to server by entering username “plants” and password “usdascs”.
-At “annex:” prompt, enter “rlogin plants.usda.gov”.
-On the emulation input screen, choose your terminal emulation.
-Exit the system with the “hangup” command.

Contact your network specialist for assistance in accessing the above services. If you have difficulty accessing

PLANTS, please contact the access coordinator via E-mail: thernandez@ag.gov.

TIB BITS

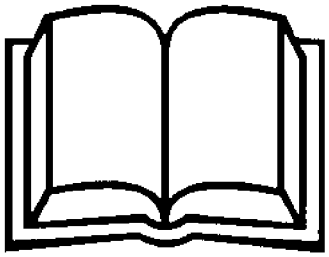
Butterfly Poachers Brought to Justice - Three men entered felony pleas of guilty to charges of conspiracy to violate U.S. wildlife laws. The case was one of the largest poaching violations involving federal lands, and the first for take of protected butterflies. The three men were charged with conspiracy to poach and traffic in endangered and other protected butterflies on federal land. They were also charged with trafficking butterflies taken illegally in Mexico. The illegally collected butterflies, totaling 2,012 specimens, were forfeited. At least 10 species protected under the Endangered Species Act were taken or traded for monetary gain. The collectors nicely labeled their specimens with the collection date, location, and collector's name. The maximum penalty is five years in prison and a $250,000 fine. ---- Endangered Species Bulletin 20(2): 4-6, MAR/APR 95.

Are Pesticides Good for You? - According to researchers at the University of Guelph, Canada, vegetables treated with pesticides could be healthier for you than pesticide-free vegetables. Researcher Jason Hlywka investigated levels of natural toxins in the common cultivated potato. The two most common toxins in potatoes, solanine and chaconine, can both damage the developing fetus in mammals. All potatoes contain trace amounts of these compounds, but they produce greater amounts when attacked by insects. They are thought to function as a chemical defense against insect pests. Hlywka compared the levels in undamaged plants with levels in plants attacked by the Colorado potato beetle and the potato leafhopper. The study showed an increase of more than 50% in toxin levels in plants fed upon by the beetles. The plants with the leafhoppers, however, had no significant change in toxin levels. The difference between the two plant feeders is thought to be related to their feeding habits. The beetles are aggressive leaf feeders, while the leafhoppers are phloem feeders. Breeding may increase the levels of natural plant defensive compounds. By selecting plants that are more naturally resistant to insects and diseases, and crossing them with natural strains breeders often increase the array of chemical defensive compounds and increase their prevalence. ---- Journal of Agriculture and Food Chemistry, via: Pesticide Outlook 6(2), APR 95.

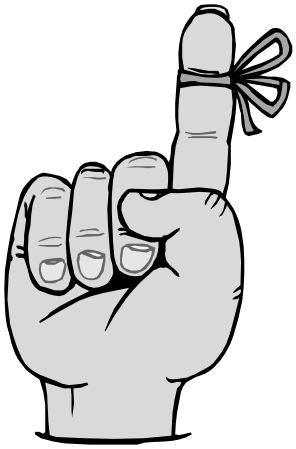
PUBLICATIONS OF INTEREST

Management of Used Treated Wood Products - A small pamphlet published by the American Wood Preservers Institute is now available through DPMIAC. Topics covered include: regulation, classification, evaluation, information sources, etc. To receive a copy, mark the last page of the TIB and return it to DPMIAC.

Identification of Gypsy Moth Larval Color Forms - A USDA Forest Service handout includes color pictures and a larval color form key. To receive a copy, mark the last page of the TIB and return it to DPMIAC.



SELECTED MEETINGS



JULY 10-13. 149th Meeting, Armed Forces Pest Management Board - Washington, D.C. COL Don Driggers, AFPMB, Forest Glen Sect., WRAMC, Washington, D.C. 20307-5001, Tel: (301) 427-5191, Fax: (301) 427-5045, DSN Prefix 291.

AUGUST 6-10. Third International Caribbean Conference of Entomology in Conjunction with the 78th Annual Meeting of the Florida Entomological Society - San Jose, COSTA RICA. Russel Mizell, University of Florida, Institute of Food and Agricultural Sciences, Agricultural Research Center, Rt 4, Box 4092, Monticello, FL 32344, Tel: (904) 997-2596, Fax: (904) 997-8178, e-mail: RFM@gnv.ifas.ufl.edu.

AUGUST 21-26. Shallow Lakes '95, International Conference on Trophic Cascades in Shallow Freshwater and Brackish Lakes - Mikolajki, POLAND. Kufel, Institute of Ecology, PAS, Hydrobiological Station, Lesna 13 11- 730 Mikolajki, Poland.

AUGUST 28 - SEPTEMBER 1. Second International Conference on Tick-Borne Pathogens at the Host-Vector Interface (THPI) - Kruger National Park, SOUTH AFRICA. Lewis Coons, University of Memphis, Department of Biology, Division of Molecular Sciences and Microbiology, Room 101, Life Sciences Bldg., Memphis, TN 38152, Tel: (901) 678-2034, Fax: (901) 678-4457, E-mail coonslb@memstvx1.memphis.edu

SEPTEMBER 4-7. 9th European Meeting: Society for Vector Ecology - Prague, CZECH REPUBLIC. National Institute of Public Health, Attn: Dr. František Rettich, Šrobárova 48, 100 42 Prague 10, Czech Republic, Tel: (422) 673 10 283, Fax: (422) 67 31 11 88.

SEPTEMBER 6-9. 2nd International Symposium on Phlebotomine Sand Flies - Merida, VENEZUELA. Secretariat: J.V. Scorza/Elina Rojas, Centro "Jose W. Torrealba," Apdo. Postal 100, TRUJILLO 3102 Venezuela, Telefax: 58-72-33503y58-74-402507.

SEPTEMBER 11-29. Modern Approaches to the Epidemiology and Control of Infectious Diseases - Oxford, UNITED KINGDOM. Sharon Bridgeman (Programme Secretary), Continuing Professional Development Centre, Department of Continuing Education, University of Oxford, 1 Wellington Square, Oxford, OX1 2JA, Tel: +44 (865) 270286, Fax: +44 (865) 270284.

SEPTEMBER 23 - OCTOBER 1. Integrated Forest Vegetation Management Course - Sault Ste. Marie, ONTARIO. Eileen Harvey, Department of Natural Resources Canada, Forest Pest Management Institute, 1219 Queen St., E., P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Tel: (705) 757-5740 ext 2251, Fax: (705) 759-5700. E-mail: eharvey@pmoeafpm.fpmi.forestry.ca

SEPTEMBER 23 - OCTOBER 1. The Advanced Forest Herbicides Course - Thunder Bay, ONTARIO. Eileen Harvey, Department of Natural Resources Canada, Forest Pest Management Institute, 1219 Queen St., E., P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Tel: (705) 757-5740 ext 2251, Fax: (705) 759-5700. E-mail: eharvey@pmoeafpm.fpmi.forestry.ca

OCTOBER 8-11. Society for Vector Ecology Annual Conference - Holiday Inn University Park, Fort Collins, CO. Society for Vector Ecology, P.O. Box 87, Santa Ana, CA 92702, Tel: (714) 971-2421, Fax: (714) 971-3940.

OCTOBER 14-22. Forest Insect Management Course - Sault Ste. Marie, ONTARIO. Eileen Harvey, Department of Natural Resources Canada, Forest Pest Management Institute, 1219 Queen St., E., P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Tel: (705) 757-5740 ext 2251, Fax: (705) 759-5700. E-mail: eharvey@pmoeafpm.fpmi.forestry.ca

OCTOBER 29 - NOVEMBER 2. National Pest Control Association - Orlando, FL. NPCA Convention Dept., 8100 Oak St., Dunn Loring, VA 22027, Tel: (800) 678-NPCA.

NOVEMBER 6-9. 150th Meeting, Armed Forces Pest Management Board - Washington, D.C. COL Don Driggers, AFPMB, Forest Glen Sect., WRAMC, Washington, D.C. 20307-5001, Tel: (301) 427-5191, Fax: (301) 427-5045, DSN Prefix 291.

NOVEMBER 17-21. Annual Meeting of the American Society of Tropical Medicine and Hygiene - Hyatt Regency, San Antonio, TX. ASTMH, 60 Revere Drive, Suite 500, Northbrook, IL 60062.

DECEMBER 5-7. Forest Pest Management / Decision Support Course - Petawawa, ONTARIO. Eileen Harvey, Department of Natural Resources Canada, Forest Pest Management Institute, 1219 Queen St., E., P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Tel: (705) 757-5740 ext 2251, Fax: (705) 759-5700. E-mail: eharvey@pmoeafpm.fpmi.forestry.ca

DECEMBER 17-21. Entomological Society of America Annual Meeting - Las Vegas Hilton, Las Vegas, NV. ESA, 9301 Annapolis Road, Lanham, MD 20706, Tel: (301) 731-4535, Fax: (301) 731-4538.

1996

FEBRUARY 5-15. The Forest Insect Management Course - Sault Ste. Marie, ONTARIO. Eileen Harvey, Department of Natural Resources Canada, Forest Pest Management Institute, 1219 Queen St., E., P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Tel: (705) 757-5740 ext 2251, Fax: (705) 759-5700. E-mail: eharvey@pmoeafpm.fpmi.forestry.ca

MARCH 24-28. American Mosquito Control Association/Mid-Atlantic Mosquito Control Association/Virginia Mosquito Control Association - Norfolk, VA. P.O. Box 5416, Lake Charles, LA 70606 Fax: (318) 478-9434.

COURSES FOR DOD PEST MANAGEMENT PERSONNEL

If you see any information needing corrections or updated information, please call 1Lt Forcum at DSN: 291-5365 or commercial (301) 427-5365, and E-mail forcumch@acq.osd.mil and pass on what you know. Thanks!

ARMY SPONSORED COURSES

1. For information on the following courses, contact: SFC Kenneth Jones, Academy of Health Sciences, U.S. Army, ATTN: MCCS-HPM (Medical Zoology Branch), Fort Sam Houston, TX 78234-6100; Tel: (210) 221-5270/4278, DSN Prefix 471. Classes are conducted at Fort Sam Houston, TX.

Pest Management Technology - Core Instruction for Initial Certification:
6-11 AUG
22-26 JAN 96 (golf course personnel only)
18-22 MAR 96
6-10 MAY 96
5-9 AUG 96

Plant Pest and Vegetation Management - Initial Certification for Categories 3, 5 & 6:
14-19 AUG
29 JAN - 2 FEB 96 (golf course personnel only)
25-29 MAR 96
13-17 MAY 96
12-16 AUG 96

Arthropod and Vertebrate Pest Management - Initial Certification for Categories 7 & 8:
21-25 AUG
1-5 APR 96
20-24 MAY 96
19-23 AUG 96

Recertification:
10-15 SEP
30 OCT - 3 NOV
8-12 JAN 96
4-8 MAR 96
22-26 APR 96
9-13 SEP 96

2. For information on courses in Germany, contact: MAJ Tom Logan, 10th Medical Lab, CMR 402, APO AE 09180; Tel: 49-6371-86-8540/44, DSN: 486-8540/44. Classes are conducted at the 10th Medical Laboratory, Landstuhl, Germany.

3. For Information on courses taught at the Environmental Training Center, contact: Ms. Gail Boeff, ATTN: ATZR-BT, Fort Sill, OK 73503-5100; Tel: (405) 351-2111, Fax: (405) 351-5722, DSN Prefix 639. The Environmental Training Center at Fort Sill, OK conducts a variety of environmental, natural resources and occupational health courses. For a complete listing of courses and schedules, contact the Center.

NAVY SPONSORED COURSES

1. For information on the following courses, contact: Mr. F. De Masi, NDVECC, Naval Air Station Jacksonville, Box 43, Jacksonville, FL 32212; Tel: (904) 772-2424, Fax: (904) 779-0107, DSN Prefix 942. Classes are conducted at the Disease Vector Ecology and Control Center, NAS Jacksonville, Jacksonville, FL.

Pesticide Applicator Training (Core) (B-322-1070), Instruction for Initial Certification:
11-18 SEP

Medical Entomology and Pest Management Technology (Reserve Training) (B-322-1050):
10-21 JUL

Plant Pest and Vegetation Management (B-322-1071), Initial Certification for Categories 2, 3, 5 & 6:
19-22 SEP

Arthropod and Vertebrate Pest Management (B-322-1072), Initial Certification for Categories 7 & 8:
25 SEP-5 OCT

Recertification Course (B322-1074), Category 8:
7-9 NOV

Operational Entomology Training (B-322-1077), designed for A/D & Reserve PMTs, EHOs, Entomologists, Epidemiologists & others assigned to PM units:
16-27 OCT

2. For information on the following courses, contact: Dr. W.E. Tozer, NDVECC, Naval Air Station Alameda, Building 130, Alameda, CA 94501-5039; Tel: (510) 263-2806, DSN Prefix 993. Classes are conducted at the Disease Vector Ecology and Control Center, NAS Alameda, Alameda, CA.

Pesticide Applicator Training (Core) (B-322-1070), Instruction for Initial Certification:
10-20 OCT

Medical Entomology and Pest Management Technology (Reserve Training) (B-322-1050):
21 AUG-1 SEP

Plant Pest and Vegetation Management (B-322-1071), Initial Certification for Categories 2, 3, 5 & 6:
20-25 OCT

Arthropod and Vertebrate Pest Management (B-322-1072), Initial Certification for Categories 7 & 8:
25 OCT-3 NOV

Recertification Course (B-322-1074), Category 8:
11-14 JUL
3-6 OCT

Shipboard Pest Management (B-322-1075): NDVECC(A)
19 JUL
9 AUG
13 SEP
11 OCT
15 NOV
6 DEC

AIR FORCE SPONSORED COURSES

1. To enroll in courses held at Sheppard AFB, contact: Programs Division, 2AF/DOP, Keesler AFB, MS 39534-5000; DSN: 597-1336. For information on the content of the following courses, refer to AFCAT 36-2223, USAF Formal Schools or contact: Mr. Hershell Bland, 366 TS/TSIM (Training Squadron/Training Squadron, Instructional Mechanical), 727 Missile Road, Sheppard AFB, TX 76311-2254; DSN: 736-5811, DSN Fax: 736-3345. Classes are conducted at Sheppard AFB, TX.

Pest Management Specialist (Certification), #J3AZR3E453 003 (previously #J3AZR56650-003). Initial Certification for Core, Categories 3,5,6,7 & 8:
6 JUL-2 AUG

2. For information on the following course, contact: Maj William Rogers, USAF School of Aerospace Medicine/EH, Brooks AFB, TX 78235-5123; Tel: (210) 536-2058/59, DSN Prefix 240. Classes are conducted at Brooks AFB, TX.

Operational Entomology Course - #B30ZY43M3-000
- The duration of this course is two weeks. It's designed to provide training for the following Air Force specialties: public health officers (43H1/3); public health apprentices (4E031, E-2 and above with completion of 5-level CDC and recommendation of supervisor); journeymen (4E051), craftsmen (4E071), and superintendents (4E091); medical entomologists (43M1/3); flight surgeons (48A1/3 or48P1/3); pest management apprentices (3E433, E-2 and above with completion of 5-level CDC and recommendation of supervisor); journeymen (3E453), craftsmen (3E473), and superintendents (3E490) with a prior AFSC (3E433, 3E453 or 3E473), or equivalent civilian pest management personnel; and other military and civilian public health and pest management personnel with consent of the faculty. Training includes vector bionomics and vector-borne disease profiles, surveillance and control of vectors and vector-borne diseases, and information, intelligence, and perspectives on developing country operations during exercises, hostilities, and natural disasters. Academic instruction, practical exercises and field experiences simulate actual vector-borne disease surveillance and control situations:
31 JUL - 11 AUG
21 AUG - 1 SEP
27 NOV - 8 DEC
22 JAN - 2 FEB 96
18-29 MAR 96
10-21 JUN 96
8-19 JUL 96

3. For information on the following course, contact: Dr. Terry L. Biery or Capt Doug Burkett, 757 AS/DOSE, YARS, Vienna, OH 44473-5000; Tel: (216) 392-1111, DSN: 346-1513/1111.
Certification and Recertification for Aerial Applicators:
10-14 JUN 96

FEDERAL REGISTER

The following is compiled from the Federal Register (FR), which is a daily listing of rules, proposed rules, and notices generated by U.S. Government agencies. Executive Orders, proclamations, and other documents from the President are also in the FR. Our listings include FR items which may be of interest to the DoD pest management and natural resources communities; environmental impact statement listings and other DoD items unrelated to pest and natural resource management generally are not included.

VOL 60 NO. 65- (1-31 Apr 1995)

3-16836-47 Fish and Wildlife Service (FWS) - Action - Proposed Rule and Notice of Petition Findings - Endangered and Threatened Wildlife and Plants - (ETWP); Proposed Determination of Endangered Status for Three Wetland Species Found in Southern Arizona and Northern Sonora

3-16920 Animal and Plant Health Inspection Service (APHIS) - Correction.

3-16920 APHIS - Correction.

5-17296-311 FWS - Action - Proposed Rule and Notice of Public Hearing - ETWP; Proposed Determination of Critical Habitat for Woundfin, Virgin River Chub, and Virgin Spinedace and Notice of Public Hearing.

5-17354 Environmental Protection Agency (EPA) - Action - Notice - Certain Companies; Applications to Register Pesticide Products.

5-17354-55 EPA - Action - Notice - Methomyl; Requests to Delete Certain Outdoor and All Indoor Non-Food Uses, DuPont Agricultural Products.

5-17364-65 FWS - Action - Notice of Document Availability - Availability of Draft Recovery Plan Revision for the Florida Manatee for Review and Comment.

10-18100-01 EPA - Action - Notice - Guidance on Issuance of Worker Protection Standard Enforcement Actions in Response to Personal Protective Equipment Violations.

11-18374 APHIS - Action - Proposed Rule; Correction to Extension of Comment Period and Notice of Public Hearing - Introduction of Nonindigenous Organisms.

12-18555 EPA - Action - Notification to Secretary of Agriculture - Amendments to the Worker Protection Standard Requirements for Crop Advisors and Training Requirements for Agricultural Workers and Pesticide Handlers; Notification to Secretary of Agriculture.

13-18727-28 APHIS - Action - Interim Rule - Oriental Fruit Fly; Removal of Quarantined Area.

13-18940-48 FWS - Action - Final Rule - ETWP; Revision of the Special Rule for Nonessential Experimental Populations of Red Wolves in North Carolina and Tennessee.

14-19013-FWS - Action - Proposed Rule and Notice of Public Hearing and Reopening of Comment Period- ETWP; Reopening of Comment Period and Notice of Public Hearings on Proposed Endangered Status with Critical Habitat in Arizona and Threatened Status in Texas, for the Cactus Ferruginous Pygmy-owl.

17-19342 National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce - Action Final Rule - Endangered and Threatened Species; Status of Snake River Spring/Summer Chinook Salmon and Snake River Fall Chinook Salmon.

19-19567-68 FWS- Action - Notice of 90-Day Petition Finding - ETWP; 90-Day Finding for a Petition to List as Endangered or Threatened the Contiguous United States Population of the North American Wolverine.

19-19580-81 EPA - Action - Notice: Intent to Delete Certain Dichlorvos (DDVP) Uses - Dichlorvos (DDVP); Deletion of Certain Uses and Directions.

19-19582-83 EPA - Action - Notice - Notice of Receipt of Requests for Amendments to Delete Uses in Certain Pesticide Registrations.

19-19583-85 EPA - Action - Notice - Notice of Receipt of Requests to Voluntarily Cancel Certain Pesticide Registrations.

19-19585-87 EPA - Action - Notice - Notice of Receipt of Requests to Voluntarily Cancel Certain Pesticide Registrations.

24-20072 FWS - Action - Proposed Rule; Reopening of Comment Period- ETWP; Reopening of Comment Period on Proposed Endangered Status for Five Freshwater Mussels and Proposed Threatened Status for Two Freshwater

Mussels from Eastern Gulf Slope Drainages of Alabama, Florida and Georgia.

VOL 60 NO. 83-105 (1-31 May 1995)

3-21816-18 EPA - Action - Notice - Notice of Receipt of Requests for Amendments to Delete Uses in Certain Pesticide Registrations.

3-21944-48 EPA - Action - Final Rule; Amendment - Pesticide Worker Protection Standard; Grace Period for Providing Worker Safety Training.

3-21948-53 EPA - Action - Final Rule - Pesticide Worker Protection Standard; Requirements for Crop Advisors.

3-21953-54 EPA - Action - Final Rule - Technical Amendment Addition of Table Exception Decisions to Early Entry Prohibition, Worker Protection Standard; Final Rule.

3-21955-60 EPA - Action - Administrative Exception Decision - Administrative Exception to Worker Protection Standard Early Entry Restrictions for Limited Contact Activities.

3-21960-65 EPA - Action - Administrative Exception Decision - Administrative Exception to Worker Protection Standard Early Entry Restrictions for Irrigation Activities.

3-21965-68 EPA - Action - Policy Statement - Worker Protection Standard; Reduced Restricted Entry Intervals for Certain Pesticides.

4-22073-74 FWS - Action - Notice of Document Availability and Request for Comments - Draft Brown Tree Snake Control Plan.

5-224040-05 FWS - Action - Notice of Availability - ETWP; Notice of Availability of Draft Economic Analysis for the Designation of Critical Habitat in States of Washington, Oregon, and California for the Western Snowy Plover.

10-24853-55 EPA - Action - Notice - Notice of Receipt of Requests to Voluntarily Cancel Certain Pesticide Registrations.

11-25201-02 NMFS, NOAA - Action Notice of Finding - Listing of Endangered and Threatened Species; Petition to Delist the Snake River Sockeye Salmon.

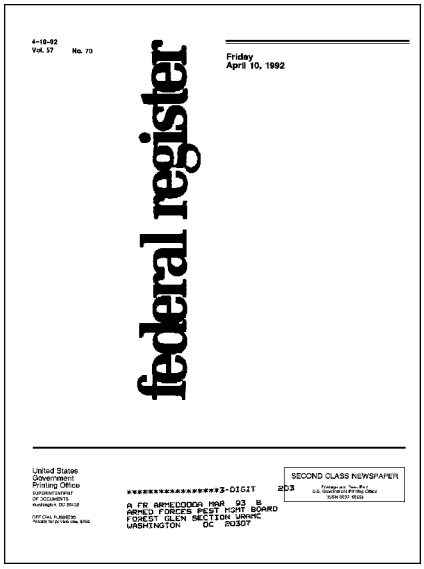
15-224040-15 FWS - Action - Proposed Rule; Notice of Public Hearing and Extension of Public Comment Period - ETWP; Notice of Public Hearing and Extension of Comment Periods on Proposed Critical Habitat Designation and Draft Economic Analysis for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*).

18-26712 FWS - Action - Reopening of the Comment Period for the Proposed Special Rule - ETWP; Proposed Special Rule for the Conservation of the Northern Spotted Owl on Non-Federal Lands.

18-26712 FWS - Action - Proposed Rule; Reopening and Extension of Comment Period - ETWP; Reopening and Extension of Comment Period on the Proposed Endangered Status for Four Plants from Vernal Pools and Mesic Areas in Northern California.

19-26863 NMFS, NOAA, Commerce - Action - Notice of Public Hearings; Request for Public Comments and Extension of the Public Comment Period - ETWP; Notice of Public Hearing on Proposed Status for the Klamath Mountains Province Steelhead.

26-27954-55 FWS - Action - Notice of 90-Day Petition Finding - ETWP; 90-Day Finding for a Petition to List the Wood Turtle (*Clemmys insculpta*) as Threatened.


4-10-92
Vol. 57 No. 70

Friday
April 10, 1992

federal register

United States
Government
Printing Office

SECOND CLASS NEWSPAPER

**********3-DIGIT 203

A FR ARMEDDDDA MAR 93 R
ARMED FORCES PEST MGMT BOARD
FOREST ENTM SECTION WRAMC
WASHINGTON DC 20307

ARMED FORCES PEST MANAGEMENT BOARD
PROFESSIONAL PEST MANAGEMENT PERSONNEL
CERTIFICATION/RECERTIFICATION INFORMATION SHEET

COMPLETE ALL ENTRIES:

1. NAME_____ ____ - __ -_____
LAST, FIRST, MI SSN (at least last 4 numbers)

2. MILITARY/CIVILIAN GRADE_____**DEGREE/Education Level & Specialty**_____

3. COMPLETE ADDRESS FOR CURRENT DUTY ASSIGNMENT:

_____
_____
_____
_____**ZIP**_____-_____
COMM TEL # (____**)**____-_____**, DSN #** ___-_____**FAX # (**____**)**___-_____

4. I REQUEST:

A. □ INITIAL CERTIFICATION (INITIAL CERTIFICATION REQUIRED AGAIN IF PRESENT CERTIFICATION EXPIRED MORE THAN 6 MONTHS.)
□ CORE
B. □ RECERTIFICATION
□ 1a. AGRICULTURAL - PLANT
□ 1b. AGRICULTURAL - ANIMAL
□ 2. FOREST
□ 3. ORNAMENTAL AND TURF
□ 4. SEED TREATMENT
□ 5. AQUATIC
□ 6. RIGHT-OF-WAY
□ 7. INDUSTRIAL, INSTITUTIONAL, STRUCTURAL, AND HEALTH RELATED
□ 8. PUBLIC HEALTH
□ 9. REGULATORY
□ 10. DEMONSTRATION AND RESEARCH
□ 11. AERIAL APPLICATION (INITIAL AERIAL APPLICATION CERTIFICATION AVAILABLE ONLY BY ATTENDING RESIDENT COURSE.)

5. PRESENT CERTIFICATION #(S)_____, _____, _____
PAST #(S)_____, _____, _____

6. I REQUEST STUDY MATERIAL BE SENT TO ME AT ABOVE ADDRESS (IN NO.3) PRIOR TO THE EXAMINATION:

□ YES □ NO

7. COMPLETE TITLE AND ADDRESS OF COMMAND TRAINING OFFICER WHERE EXAM SHOULD BE SENT:

_____
_____
_____
_____**ZIP**_____-_____

8. COMPLETE TITLE AND ADDRESS OF OFFICIAL/COMMANDING OFFICER WHERE CERTIFICATE SHOULD BE FORWARDED FOR FINAL SIGNATURE BEFORE AWARDING:

_____
_____
_____
_____**ZIP**_____-_____

9. REQUESTORS SIGNATURE: _____ **(JUN 95)**

Return to COL Perkins, AFPMB Forest Glen Section, WRAMC, Washington, DC 20307-5001.
Fax: (301) 427-5054 DSN Prefix 291.

What do you think?

Please let us know how you feel about this publication.
Publication title/date: _____

Use this scale to rate each category: (5) = Highly Favorable, (4) = Favorable, (3) = Neutral, (2) = Unfavorable, (1) = Highly Unfavorable.

_____ Usefulness of Data _____ Readability
_____ Pertinent Material _____ Appearance

The most useful sections are: _____
_____
_____
_____

The least useful sections are: _____
_____
_____
_____

❑ **Put me on the Technical Information Bulletin Mailing List.** This periodical provides current information on pest management, pesticides, medical entomology, natural resources, laws and regulations, and courses and meetings.

Please send me the following Publications:

Technical Information Memoranda

❑ NO. 5, Land Snails - Jun 1990
❑ NO. 11, Hydrogen Phosphide Fumigation with Aluminum Phosphide - Feb 1987
❑ NO. 13, Ultra Low Volume Dispersal of Insecticides by Ground Equipment - Mar 1985
❑ NO. 14, Personal Protective Equipment for Pest Management Personnel - Mar 1992
❑ NO. 15, Pesticide Spill Prevention & Management - Jun 1992
❑ NO. 16, Pesticide Fires: Prevention, Control & Cleanup - Jun 1981
❑ NO. 17, Pest Control Facilities - Replaced by MIL HDBK 1028/8A, 1 Nov 91
❑ NO. 18, Installation Pest Management Program Guide - Feb 1987
❑ NO. 20, Pest Management in Health Current Care Facilities - Oct 1989
❑ NO. 21, Pesticide Disposal Guide for Pest Control Shops - Oct 1986
❑ NO. 22, Guidelines for Testing Experimental Pesticides on DoD Property - Nov 1983
❑ NO. 23, Schistosomiasis - Jan 1987
❑ NO. 24, Contingency Pest Management Pocket Guide - Sep 1991
❑ NO. 25, Devices for Electrocution of Flying Insects - Aug1988
❑ NO. 26, Lyme Disease - Vector Surveillance and Control - Mar 1990
❑ NO. 27, Stored Products Pest Monitoring Techniques - Jun 1992
❑ NO. 29, IPM In and Around Buildings - Jul 94
❑ NO. 31, Contingency Retrograde Washdowns: Cleaning and Inspection Procedures - Dec 93

Other Publications

❑ Management of Used Treated Wood Products
❑ Identification of Gypsy Moth Larval Color Forms

Address Change/Addition

~~❑ address update (send old mailing label)~~
❑ this is a new address

name _____

unit/office _____

address _____

city _____ state _____ zip code _____

telephone number _____

❑Air Force ❑Army ❑Navy ❑Fed Agcy ❑State Agcy ❑Other

Call in or send requests/address changes to:

AFPMB/DPMIAC
Forest Glen Section, WRAMC
Wash., D.C. 20307-5001
Tel: (301)427-5365

Fax: (301)427-5466
DSN Prefix 291
BBS: (301)427-5121